

12072
Olivine Basalt
103.6 grams

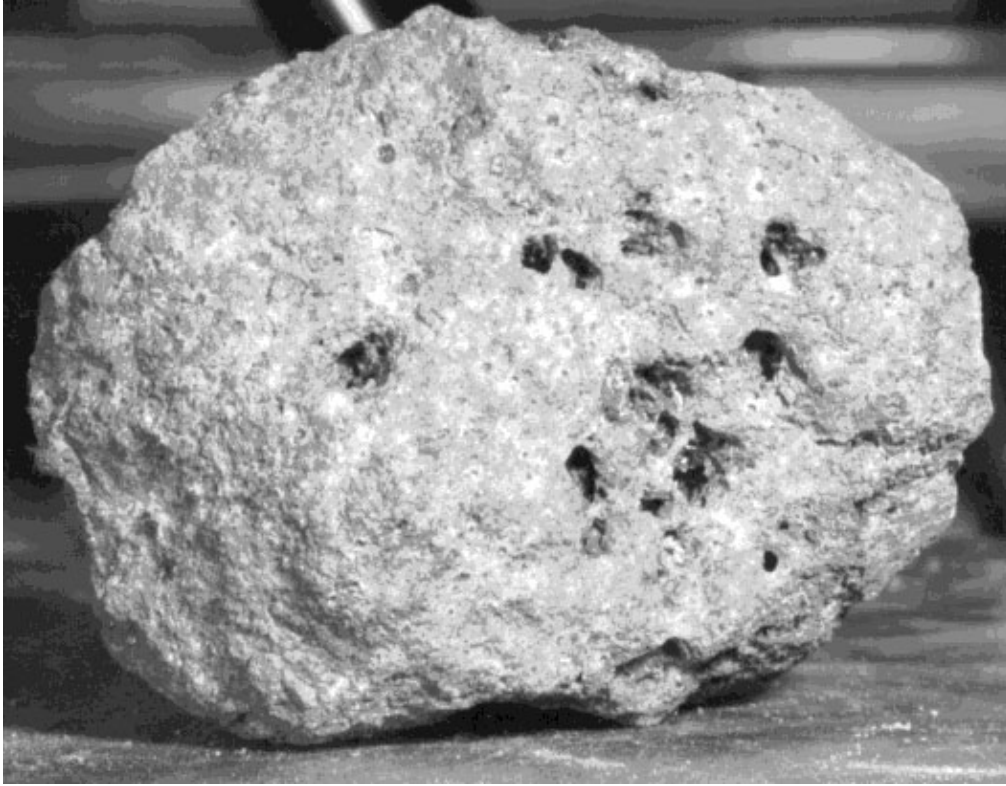


Figure 1: Photo of 12072. Sample is 5.5 cm. NASA # S69-61750.

Introduction

Olivine basalt 12072 is rounded and covered by micrometeorite craters on all sides (figure 1). It has numerous vugs and vesicles and has been used in the past for public display. 12072 has not been dated.

showed that it belonged to the grouping known as olivine basalt (identical mode?).

Mineralogy

Olivine: Olivine is Fo₇₆ to Fo₆₂ (Beaty et al. 1979).

Petrography

The petrology of 12072 is discussed by Beaty et al. (1979) and Neal et al. (1994). Olivine, chromite and pyroxene phenocrysts are set in a variolitic groundmass of pyroxene, plagioclase, ilmenite and minor spinel, troilite, cristobalite, Fe-metal, apatite, fayalite and two immiscible glasses (Beaty et al. 1979). Olivine phenocrysts are rimmed by pyroxene and include chromite octahedra. Pyroxenes have colorless pigeonite cores rimmed with pinkish augite which grades continuously into Fe-rich groundmass pyroxene (figure 2). While Beaty et al. concluded that 12072 was a feldspathic basalt, the analyses by Neal et al.

Mineralogical Mode of 12072

	Beaty et al. 1979	Neal et al. 1994
Olivine	5.7	5.7
Pyroxene	49	49
Plagioclase	39	38.9
Ilmenite	1.1	1.4
Chromite ‘	0.3	0.2
Mesostasis	1.1	1.4
“silica”		3.1

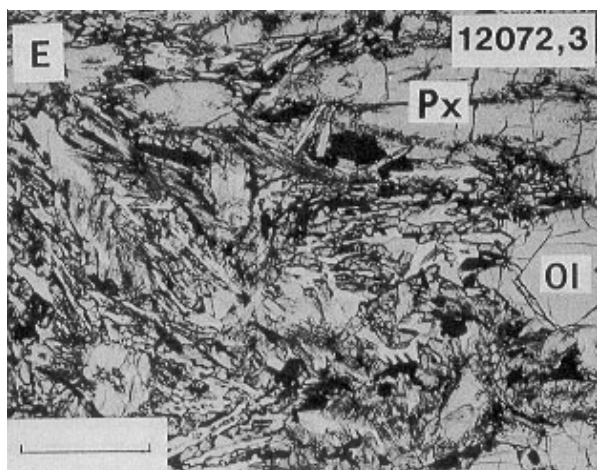


Figure 2: Texture of 12072.. Scale is 0.5 mm. Figure 2e from Neal et al. (1994).

Pyroxene: Beaty et al. (1979) determined the composition of pyroxene (figure 3). Pyroxenes zone continuously to pyroxferroite (no discontinuity).

Plagioclase: Plagioclase is An_{96} to An_{85} (Beaty et al. 1979).

Metallic Iron: Small iron grains are found in the mesostasis (figure 4).

Chemistry

Chemical analysis by ICP-MS (Snyder et al. 1997) seem to agree with those by INAA (Neal et al. 1994). However, a calculated analysis for major elements by Beaty et al. (1979) was not as mafic (table 1).

Radiogenic age dating

Not dated.

Other Studies

Bogard et al. (1971) reported the content and isotopic composition of rare gases in 12072.

Processing

12072 (whole piece) was once used as a public display, and has since been demounted, and re-entered into the collection.

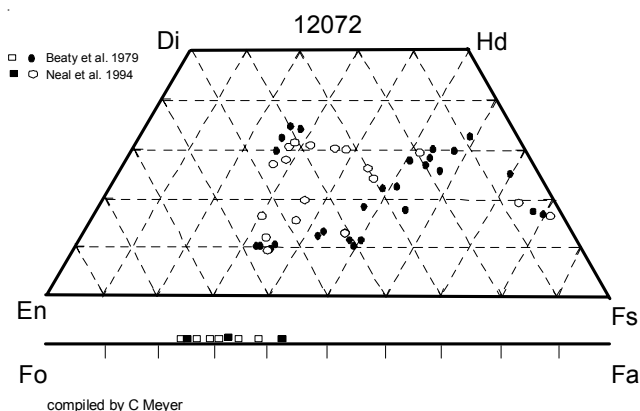


Figure 3: Pyroxene composition for 12072 (adapted loosely from Beaty et al. 1979, Neal et al. 1994).

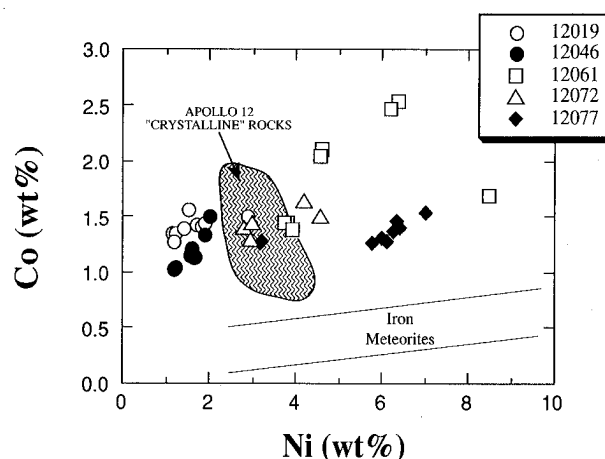


Figure 4: Composition of iron grain in Apollo 12 basalts (from Neal et al. 1994).

List of Photo #s for 12072

S69-61740 – 61763	B & W mug
S94-035807 – 035808	color
S94-035811	

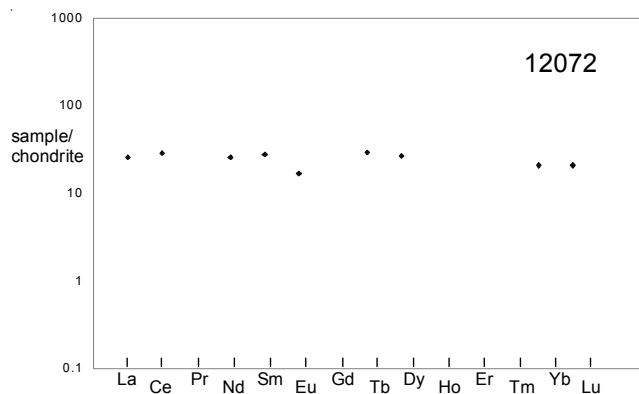


Figure 5: Normalized rare-earth-element composition for 12072 (data from Neal et al. 1994).

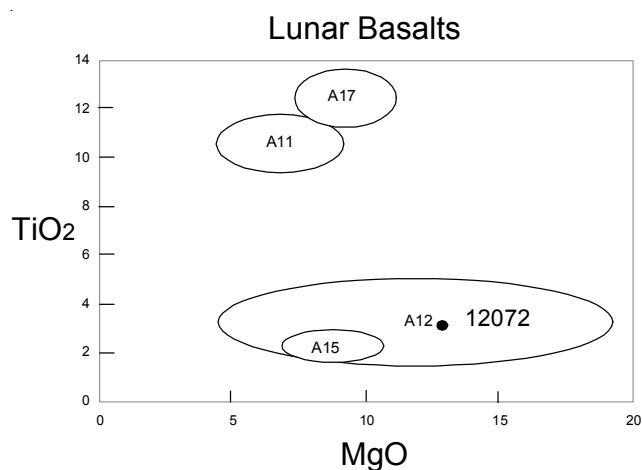


Figure 6: Composition of 12072 compared with that of other lunar samples.

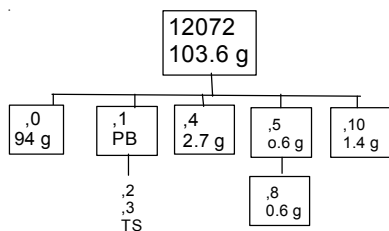


Table 1. Chemical composition of 12072.

reference	Neal94	Beaty79	Snyder97
weight	.618 g		
SiO ₂ %		48.14	(b)
TiO ₂	3	(a) 1.81	3
Al ₂ O ₃	8.5	(a) 11.64	8.5
FeO	21.3	(a) 17.46	21.3
MnO	0.262	(a) 0.25	0.26
MgO	13.3	(a) 8.57	13.3
CaO	8.7	(a) 11.38	8.7
Na ₂ O	0.227	(a) 0.37	0.23
K ₂ O	0.059	(a) 0.04	0.06
P ₂ O ₅		0.06	
S %		0.16	
sum			
Sc ppm	47.1	(a)	
V	165	(a)	
Cr	3760	(a) 2737	3820 (c)
Co	50.5	(a)	48.2 (c)
Ni	54	(a)	55.5 (c)
Cu			8.86 (c)
Zn			8.14 (c)
Ga			2.85 (c)
Ge ppb			
As			
Se			
Rb			0.883 (c)
Sr			75.13 (c)
Y			30.7 (c)
Zr			95.9 (c)
Nb			5.36 (c)
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb			107 (c)
Cd ppb			
In ppb			
Sn ppb			
Sb ppb			
Te ppb			
Cs ppm			0.047 (c)
Ba	56	(a)	51.2 (c)
La	6.2	(a)	6.23 (c)
Ce	17.7	(a)	17 (c)
Pr			2.22 (c)
Nd	11.6	(a)	11 (c)
Sm	4.2	(a)	4.01 (c)
Eu	0.96	(a)	0.85 (c)
Gd			3.91 (c)
Tb	1.07	(a)	0.74 (c)
Dy	6.6	(a)	4.52 (c)
Ho			0.97 (c)
Er			2.66 (c)
Tm			0.37 (c)
Yb	3.6	(a)	2.63 (c)
Lu	0.5	(a)	0.33 (c)
Hf	3	(a)	
Ta	0.43	(a)	0.244 (c)
W ppb			
Re ppb			
Os ppb			
Ir ppb			
Pt ppb			
Au ppb			
Th ppm	0.77	(a)	0.726 (c)
U ppm			0.164 (c)

technique: (a) INAA, (b) modal analysis, (c) ICP-MS